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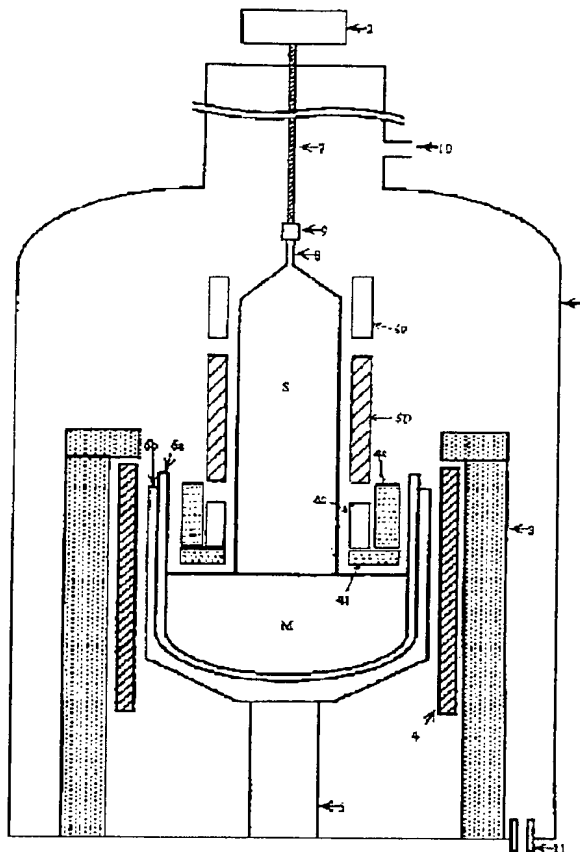
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TITLE : SILICON SINGLE CRYSTAL, ITS
PRODUCTION AND APPARATUS FOR
PRODUCTION



ABSTRACT : PROBLEM TO BE SOLVED: To produce a Czochralski(cz) silicon single crystal, remarkably reduced in crystal originated particle(COP) defects, excellent in withstand voltage characteristics of an oxide film or remarkably reduced in dislocation defects and excellent in device characteristics such as PN junction leak current characteristics.

SOLUTION: An apparatus for producing having a cooling part 40 arranged so as to surround a silicon single crystal S near the surface of a silicon melt M, heat insulating parts 41 and 42 provided on the side of the surface of the melt of the cooling part 40 and on the side of the outer peripheral surface thereof and a heating part 50, arranged so as to surround the silicon single crystal S above the cooling part 40 and having ≥ 200 mm length in the crystal growth direction is used in the production of the silicon single crystal S having ≥ 100 mm diameter according to the Czochralski method. The pulling up and growing of the crystal is carried out under conditions so as to provide $12^{\circ}\text{C}/\text{m}$ cooling gradient from the crystal solidification temperature to $1,300^{\circ}\text{C}$ crystal temperature and ≥ 200 mm holding region where the crystal temperature is $\geq 1,200^{\circ}\text{C}$ and the solidification temperature or below.

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